

Completing the Square
Day #2

Find the vertex of

$$f(x) = -2x^2 + 8x - 17$$

$$f(x) = -2(x^2 - 4x) - 17 \quad \left(\frac{4}{2}\right)^2$$

$$f(x) = -2(x^2 - 4x + 4 - 4) - 17 \quad (2)^2 = 4$$

$$f(x) = -2[(x-2)^2 - 4] - 17$$

$$f(x) = -2(x-2)^2 + 8 - 17$$

$$f(x) = -2(x-2)^2 - 9 \quad f(x) = a(x-h)^2 + k$$

$$(2, -9)$$

Mar 27-12:41 PM

Completing the Square Steps

$$f(x) = -2x^2 + 8x - 17$$

Partial Factor

$$f(x) = -2(x^2 - 4x)$$

$b/2^2$ - c value

$$f(x) = -2(x^2 - 4x + 4 - 4) - 17$$

add and subtract new c value

$$f(x) = -2[(x-2)^2 - 4] - 17$$

make the perfect square

$$f(x) = -2(x-2)^2 + 8 - 17$$

distributive property

$$f(x) = -2(x-2)^2 - 9$$

group like terms (c value)

$$f(x) = a(x-h)^2 + k$$

$$(2, -9)$$

Oct 19-8:39 AM

$$f(x) = 3x^2 - 12x + 7$$

$$f(x) = 3(x^2 - 4x) + 7 \quad \text{partial factor}$$

$$f(x) = 3(x^2 - 4x + 4 - 4) + 7$$

$$f(x) = 3[(x-2)^2 - 4] + 7$$

$$f(x) = 3(x-2)^2 - 12 + 7 \quad \left(\frac{4}{2}\right)^2 = 2^2 = 4$$

$$f(x) = 3(x-2)^2 - 5$$

$$(2, -5)$$

Mar 22-9:53 AM

State in Vertex Form

$$f(x) = 3x^2 + 9x - 16$$

$$f(x) = 3(x^2 + 3x) - 16$$

$$f(x) = 3(x^2 + 3x + \frac{9}{4} - \frac{9}{4}) - 16 \quad \left(\frac{3}{2}\right)^2$$

$$f(x) = 3\left[\left(x + \frac{3}{2}\right)^2 - \frac{9}{4}\right] - 16$$

$$f(x) = 3\left(x + \frac{3}{2}\right)^2 - \frac{27}{4} - 16$$

$$f(x) = 3\left(x + \frac{3}{2}\right)^2 - \frac{27}{4} - \frac{64}{4}$$

$$f(x) = 3\left(x + \frac{3}{2}\right)^2 - \frac{91}{4}$$

$$\left(-\frac{3}{2}, -\frac{91}{4}\right)$$

Oct 19-7:35 AM

$$f(x) = 5x^2 - 25x + 6$$

$$f(x) = 5(x^2 - 5x) + 6$$

$$f(x) = 5\left(x^2 - 5x + \frac{25}{4} - \frac{25}{4}\right) + 6 \quad \left(\frac{5}{2}\right)^2 \Rightarrow \frac{25}{4}$$

$$f(x) = 5\left[\left(x - \frac{5}{2}\right)^2 - \frac{25}{4}\right] + 6$$

$$= 5\left(x - \frac{5}{2}\right)^2 - \frac{125}{4} + 6$$

$$= 5\left(x - \frac{5}{2}\right)^2 - \frac{125}{4} + \frac{24}{4}$$

$$= 5\left(x - \frac{5}{2}\right)^2 - \frac{101}{4} \quad \left(\frac{5}{2}, -\frac{101}{4}\right)$$

Oct 11-8:48 AM

$$f(x) = 5x^2 - 25x + 6 \quad \left(\frac{5}{2}\right)^2$$

$$f(x) = 5(x^2 - 5x) + 6 \quad (2.5)^2$$

$$f(x) = 5(x^2 - 5x + 6.25 - 6.25) + 6$$

$$f(x) = 5\left[\left(x - 2.5\right)^2 - 6.25\right] + 6$$

$$f(x) = 5(x - 2.5)^2 - 31.25 + 6$$

$$f(x) = 5(x - 2.5)^2 - 25.25$$

Oct 12-10:25 AM

$$\begin{aligned}
 f(x) &= \frac{1}{2}x^2 + 3x + 2 \quad \left(\frac{6}{2}\right)^2 \\
 f(x) &= \frac{1}{2}(x^2 + 6x) + 2 \quad \begin{array}{l} = 3^2 \\ 3 \div \frac{1}{2} \\ 3 \times \frac{2}{1} \\ = 6 \end{array} \\
 f(x) &= \frac{1}{2}(x^2 + 6x + 9 - 9) + 2 \\
 f(x) &= \frac{1}{2}\left[(x+3)^2 - 9\right] + 2 \quad \begin{array}{l} -\frac{9}{1} \times \frac{1}{2} \\ -\frac{9}{2} \end{array} \\
 f(x) &= \frac{1}{2}(x+3)^2 - \frac{9}{2} + 2 \\
 f(x) &= \frac{1}{2}(x+3)^2 - \frac{9}{2} + \frac{4}{2} \\
 f(x) &= \frac{1}{2}(x+3)^2 - \frac{5}{2} \quad \left(-3, -\frac{5}{2}\right)
 \end{aligned}$$

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$$\begin{aligned}
 f(x) &= \frac{3}{4}x^2 - 5x + 3 \\
 f(x) &= \frac{3}{4}\left(x^2 - \frac{20}{3}x\right) + 3 \quad \begin{array}{l} -5 \div \frac{3}{4} \\ -5 \times \frac{4}{3} \\ -\frac{20}{3} \end{array} \\
 f(x) &= \frac{3}{4}\left(x^2 - \frac{20}{3}x + \frac{400}{36} - \frac{400}{36}\right) + 3 \quad \begin{array}{l} -\frac{20}{3} \\ -\frac{20}{3} \end{array} \\
 f(x) &= \frac{3}{4}\left[\left(x - \frac{20}{6}\right)^2 - \frac{400}{36}\right] + 3 \quad \begin{array}{l} \text{C value} \\ \Rightarrow \frac{20}{3} \div \frac{1}{2} \\ = \left(\frac{20}{6}\right)^2 \end{array} \\
 f(x) &= \frac{3}{4}\left(x - \frac{20}{6}\right)^2 - \frac{1200}{144} + 3 \\
 f(x) &= \frac{3}{4}\left(x - \frac{20}{6}\right)^2 - \frac{1200}{144} + \frac{432}{144} \\
 f(x) &= \frac{3}{4}\left(x - \frac{20}{6}\right)^2 - \frac{768}{144} \\
 &\quad \left(\frac{20}{6}, -\frac{768}{144}\right)
 \end{aligned}$$

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$$\begin{aligned}
 f(x) &= 1.7x^2 - 6.8x + 4.7 \\
 f(x) &= 1.7(x^2 - 4x) + 4.7 \\
 f(x) &= 1.7(x^2 - 4x + 4 - 4) + 4.7 \\
 f(x) &= 1.7\left[(x-2)^2 - 4\right] + 4.7 \\
 f(x) &= 1.7(x-2)^2 - 6.8 + 4.7 \\
 f(x) &= 1.7(x-2)^2 - 2.1 \quad (2, -2.1)
 \end{aligned}$$

Mar 27-1:07 PM

Homework

p 214-215

q 7,8,9, 12, 13&14

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